

(12) INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(19) World Intellectual Property Organization International Bureau



(43) International Publication Date  
28 July 2005 (28.07.2005)

PCT

(10) International Publication Number  
**WO 2005/068403 A3**

(51) International Patent Classification<sup>7</sup>: C07B 35/02,  
35/04

(21) International Application Number:  
PCT/US2004/040243

(22) International Filing Date: 2 December 2004 (02.12.2004)

(25) Filing Language: English

(26) Publication Language: English

(30) Priority Data:  
60/534,592 6 January 2004 (06.01.2004) US

(71) Applicant (for all designated States except US):  
MALLINCKRODT INC. [US/US]; 675 McDonnell Boulevard, P.O. Box 5840, St. Louis, MO 63134 (US).

(72) Inventors; and

(75) Inventors/Applicants (for US only): WANG, Peter, Xianqi [US/US]; 1708 Eldon Ridge Court, Chesterfield, MO 63017 (US). MOSER, Frank, W. [US/US]; 3896 Petrified Forest Drive, Arnold, MO 63010 (US).

(74) Agents: REBMAN, Christine, M. et al.; Mallinckrodt Inc., 675 McDonnell Boulevard, P.O. Box 5840, St. Louis, MO 63134 (US).

(81) Designated States (unless otherwise indicated, for every kind of national protection available): AE, AG, AL, AM,

AT, AU, AZ, BA, BB, BG, BR, BW, BY, BZ, CA, CH, CN, CO, CR, CU, CZ, DE, DK, DM, DZ, EC, EE, EG, ES, FI, GB, GD, GE, GH, GM, HR, HU, ID, IL, IN, IS, JP, KE, KG, KP, KR, KZ, LC, LK, LR, LS, LT, LU, LV, MA, MD, MG, MK, MN, MW, MX, MZ, NA, NI, NO, NZ, OM, PG, PH, PL, PT, RO, RU, SC, SD, SE, SG, SK, SL, SY, TJ, TM, TN, TR, TT, TZ, UA, UG, US, UZ, VC, VN, YU, ZA, ZM, ZW.

(84) Designated States (unless otherwise indicated, for every kind of regional protection available): ARIPO (BW, GH, GM, KE, LS, MW, MZ, NA, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IS, IT, LT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

Published:

- with international search report
- before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments

(88) Date of publication of the international search report:  
1 September 2005

For two-letter codes and other abbreviations, refer to the "Guidance Notes on Codes and Abbreviations" appearing at the beginning of each regular issue of the PCT Gazette.

WO 2005/068403 A3

(54) Title: METHOD FOR SELECTIVE REDUCTION OF AROMATIC COMPOUNDS

(57) Abstract: A method for the selective reduction of an aromatic compound. The present invention provides a method for preventing the reduction of at least one halogen substituted aromatic ring of an aromatic compound, while allowing the reduction of at least one functional group on the aromatic compound. In the present invention at least one hydroxyl group is placed on the at least one halogen substituted aromatic ring to be protected from reduction. The aromatic compound is then reacted with at least one alkali metal in at least one nitrogen containing base and at least one alcohol at a ratio of the alcohol to the nitrogen containing base at which the aromatic ring with the hydroxyl group is protected from reduction, while the desired functional group is reduced.

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/040243

A. CLASSIFICATION OF SUBJECT MATTER  
IPC 7 C07B35/02 C07B35/04

According to International Patent Classification (IPC) or to both national classification and IPC

## B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)  
IPC 7 C07B

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, WPI Data, PAJ, BEILSTEIN Data, CHEM ABS Data

## C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	A. J. BIRCH AND D. NASIPURI: "REACTION MECHANISMS IN REDUCTIONS BY METAL-AMMONIA SOLUTIONS" TETRAHEDRON, vol. 6, 1959, pages 148-153, XP002333355 the whole document -----	1-17
A	KAISER E M: "A COMPARISON OF METHODS USING LITHIUM/AMINE AND BIRCH REDUCTION SYSTEMS" SYNTHESIS, THIEME, STUTTGART, DE, no. 8, August 1972 (1972-08), pages 391-415, XP002046306 ISSN: 0039-7881 the whole document ----- -/-	1-17



Further documents are listed in the continuation of box C.



Patent family members are listed in annex.

## \* Special categories of cited documents :

- \*A\* document defining the general state of the art which is not considered to be of particular relevance
- \*E\* earlier document but published on or after the international filing date
- \*L\* document which may throw doubts on priority, claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- \*O\* document referring to an oral disclosure, use, exhibition or other means
- \*P\* document published prior to the international filing date but later than the priority date claimed

\*T\* later document published after the International filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

\*X\* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

\*Y\* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

\*&\* document member of the same patent family

Date of the actual completion of the international search

28 June 2005

Date of mailing of the international search report

12/07/2005

Name and mailing address of the ISA

European Patent Office, P.B. 5818 Patentlaan 2  
NL - 2280 HV Rijswijk  
Tel. (+31-70) 340-2040, Tx. 31 651 epo nl.  
Fax: (+31-70) 340-3016

Authorized officer

Sen, A

## INTERNATIONAL SEARCH REPORT

International Application No  
PCT/US2004/040243

## C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	A.J. BIRCH AND G. SUBBA RAO: "Reductions by metal-ammonia solutions and related reagent" ADVANCED ORGANIC CHEMISTRY, vol. 8, 1972, pages 1-65, XP009049761 the whole document -----	1-17